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## TRAY AND SUPPORT FOR TRANSPORTING WHEELS/OR RIMS

5                   The present invention relates to a tray accommodating and transporting wheels and/or rims of various diameters and configurations, as well as to a support for use with this tray.

Description of the Prior Art

10                   Formerly, wheels of automotive vehicles were only a vital accessory and did not have a function of composing the appearance of the equipped vehicle; this role was played by wheel caps.

                  However, with the passage of time and in view of the high development of the automobile industry these days, the automotive wheels are no longer a mere vital accessory and have now a fundamental  
15                   importance as a stylistic element of the vehicle, irrespective of its market segment.

                  Independently of their construction/configuration, wheels ply an important role both in appearance of the vehicle and in safety. So, after the wheels have been manufactured, they should be transported very carefully,  
20                   because a wheel with scratches and/or a squashed wheel loses its market value. The transport of the wheels may be carried out by any means, by air, by land, but generally, at least in Brazil, the wheels are transported by trucks on roadways, which, as is well known, are excessively uneven. So, the wheels may suffer damages during their transportation.

25                   The known trays designed for transporting wheels provide a safe transport, but do not provide transport for wheels of different diameters together. Usually, trays only accommodate wheels of the same diameter. So, if there is a need to transport wheels of different diameters, various trays have to be necessarily used.

30                   Due to these drawbacks, various types of trays have been developed, which enable one to transport automotive wheels of different diameters at the same time.

Document WO96/24530 describes a tray for accommodating wheels, provided with recesses defining circumferences of varied diameters and having common stretches to accommodate wheels of different diameters, which can carry wheels of the same diameter at the same time, as well as  
5 mixture of two or three configurations of wheels. The great drawback of this solution is the great material demand required to make this tray, which raises its market value due to the thickness necessary to form the layers for fitting the wheels.

Document DE4339445 describes a tray provided with various  
10 configurations of guides for accommodating wheel rims of different diameters. These guides prevent the rims from moving to the sides, besides fitting them into the tray, and are configured so that they will permit little flexibility with regard to the diameters of the wheels to be transported.

Document JP8026283 describes a tray for accommodating and  
15 transporting automotive wheels which has grooves in its surface corresponding to the diameters of the wheels to be transported. These grooves are configured so that the tray can receive and accommodate wheels of different diameters. The difficulty encountered in this solution is the achievement of the grooves, which requires expensive manufacturing steps.

Document DE4229698 describes a tray for accommodating  
20 wheels of different diameters, provided with transverse bars and frames composed of overlapped annular segments forming steps for accommodating wheels of different diameters. Each frame can accommodate at least two wheel configurations with different diameters, according to the need. The  
25 transverse bars and the frames are assembled by means of various pieces, configuring a complex and difficult-to-assemble tray. In addition, these frames allow the wheels to detach easily, since they are not really fitted, but merely accommodated in the steps.

Document DE4310373 describes an apparatus for stacking and  
30 transporting wheel rims. This apparatus comprises a tray that accommodates wheel rims of different diameters, which are fitted onto protuberances existing on the tray. These protuberances are provided in such a way that

they will accommodate rims of automotive wheels of different diameters and are configured so that only one rim size per use will be accepted, that is to say, wheel rims of different sizes may not be accommodated on the tray at the same time. This document also relates to wheel rims and not to the assembled wheel.

The earlier techniques have not yet provided a simple and practical tray for accommodating wheels and/or wheel rims of different diameters simultaneously.

#### Objectives of the Invention

An objective of the present invention is to provide a tray for transporting and stacking wheels and wheel rims, which is easy to use, has a low production cost and enables one to transport wheel rims and vehicle wheels of different diameters and/or configurations simultaneously.

Another objective of the present invention is to provide a support for use with a tray as described above.

#### Brief Description of the Invention

The objectives of the present invention are achieved by means of a tray, particularly for transporting wheels and/or rims of vehicle wheels, which comprise at least one support having at least a first frame comprising at least one projection and defining at least a first situation of interaction with a first wheel configuration, the support being provided with at least one second frame, the second frame cooperating with the projection of the first frame, defining at least a second situation of interaction with a second wheel configuration.

The objectives of the present invention are also achieved by means of a support, particularly for use with a tray for transporting wheels and/or rims of vehicle wheels, which has at least a first frame comprising at least one projection and defining at least a first situation of interaction with a first wheel configuration and having at least one second frame cooperating with a projection of the first frame defining at least a second situation of interaction with a second wheel configuration.

The present invention has the following advantages, among others:

- possibility of transporting wheel rims and vehicles wheels of different diameters and/or configurations simultaneously on a single tray;
- 5    - scale economy;
- easy manufacture;
- possibility of changing the wheel supports existing at the tray to bring about varied configurations for different types of wheels and/or rims; and
- 10    - safe transport of the wheels and/or rims, without the risk of damaging them.

#### Brief Description of the Drawings

The present invention will now be described in greater detail with reference to an embodiment represented in the drawings. The figures

15    show:

- Figure 1 is a perspective view of the tray for transporting wheels and/or wheel rims of the present invention;
- Figure 2 is a perspective view in detail of a component of the tray support of the present invention; and
- 20    - Figure 3 is a top view of the tray for transporting wheels and/or wheel rims of the present invention.

#### Detailed Description of the Invention

As can be seen in figure 1, the tray 1 for fitting wheels and wheel rims of the present invention comprises a rectangular base to which at

25    least one first support 2a and at least one second support 2b area associated, both of them being preferably Y-shaped, defining three projections that are 120° offset.

Each first support 2a enables one to fit wheels of a specific and single diameter to be fitted. Each projection of the Y-shaped support 2a is

30    provided with a first bottom step 5a, a second intermediate step 4a, a third top step 3a and a top surface, the steps configuring a stair. These steps 3a,

4a, 5a define four first imaginary circumferences around the support 2a, having its center as a central point.

The function of the steps 3a, 4a, 5a is to enable one to fit wheels and/or wheel rims in such a way that they will not move while being transported and/or stacked. The flange of the wheel rim rests on the steps 5a; the steps 4a permit constriction of the rim, and the steps 3a permit constriction of the recess of the intermediate region of the rim, namely that of a smaller internal diameter. In the case of transporting a wheel, the disc faces upwards, that is, it does not touch the support 2a. Further, the wheel may be fitted in such a way that the disc will face downwards. The mentioned constrictions are possible, because the three steps 3a and the three steps 4a define the already mentioned circumferences, the diameters of which cooperate with the respective points of the wheel rim.

However, one may design a support 2a with which the wheel/rim interacts, or else it is fitted on other steps than those explained above, and even so it will be included in the protection scope of the present invention.

As already mentioned, the tray 1 comprises second supports 2b, which enables one to fit and transport at least one first and at least one second configuration of wheels/rims of different diameters. Each support 2b is provided with a first Y-shaped frame having three projections that are separated by  $120^\circ$  and two second frames 6' cooperating with the first one, which are axially aligned and adjacent two of the three projections of the first frame 6. Alternatively, one may foresee a second support 2b, on which the second frames are positioned in a different way, as long as they cooperate with the first frame so as to enable one to transport wheels/rims of first and second configurations, as will be explained later.

Thus, as in the case of the support 2a, each of the three projections of the first frame 6 of each support 2b is provided with a first bottom step 5b, a second intermediate step 4b, a third top step 3b, and a top surface, the steps consecutively configuring a stair. These steps 3b, 4b, 5b form four second imaginary circumferences around the first frame

6, having as a central point the center of the first frame 6. The first frame 6 may be identical to the support 2a.

The two second frames 6', the positioning of which has already been mentioned, also have three steps, a bottom step 5c, a second  
5 intermediate step 4c, a third top step 3c, and a top surface, the steps consecutively forming a stair. These steps are equivalent to the steps of the first frame 6, that is to say, they have the same height, positioning and geometric relations.

These two second frame 6' form four third imaginary  
10 circumferences together with the adjacent projection of the support 2b, which has not frame 6'. These third circumferences have diameters that are larger than those of the second imaginary circumferences, which result from the displacement of their central point due to the positioning of the second frames 6'.

15 Thus, the support 2b may fit wheels/rims of first and second configurations, the fitting being effected by means of the steps of both the frame 6a and the frame 6', which brings about a broader use of the tray 1 containing them, as will be better explained later.

The support 2b has two possible situations of interaction for  
20 fitting the wheel; a first situation 100 occurs with the interaction of the first wheel/rim configuration on the first frame 6, wherein the flange rests on the steps 5b of the three projections. The respective steps 4b permit constriction of the rim, and the steps 3b permit constriction of the intermediate region of the rim, that is to say, the region of smaller internal diameter. Said  
25 constrictions are possible because the three steps 3b and the three steps 4b define the already mentioned circumferences, the diameters of which cooperate with the respective points of the wheel rim. In the case of transporting a wheel, the disc faces upwards, that is, it does not touch the support 2b, or else the wheel may be fitted in such a way that the disc will  
30 face downwards.

A second situation of interaction 200 occurs when the wheel/rim has a diameter that corresponds to the second

configuration and there is cooperation of one of the projections of the first frame 6 with the second frames 6', where the flange of the wheel rim rests on the step 5b and on the steps 5c of the second frames 6'. The step 4b cooperating with the steps 4c permits constriction of the rim, and the step 5 3b cooperating with the steps 3c permit constriction of the recess of the intermediate region of the rim, namely that of smaller internal diameter. The second frame 6' is detailed in figure 2.

Evidently, the second configuration of a wheel/rim to be transported in the second situation of interaction 200 has a diameter larger than that of the first configuration of wheel/rim to be transported in the first 10 situation of interaction 100.

The tray 1 may have varying area, shape and height, and a single tray 1 may comprise several supports for wheels/rims of at least one smaller diameter and supports for wheels/rims of at least one larger diameter, 15 thus enabling one to transport several wheels/rims of different diameters on a single tray, which brings about scale economy. Also, the number of supports 2a, 2b on the tray 1 may vary according to its area, and according to the need of each company. Alternatively, it is possible to provide a tray 1 that will include only the second supports 2b.

20 The supports 2b are configured so as to receive preferably first and second configurations of wheels/rims having diameters varying by three inches from each other, as for example 12" and 15", 13" and 16", 14" and 17", 15" and 18", 16" and 19", 17" and 20", which are the most widely used diameters. However, the combination of diameters that may be fitted onto the 25 same support may vary according to the need of the company. The only configuration that is difficult to carry out is that of the support for fitting wheels of contiguous diameters, since in this way the two frames 6 and 6' are very close to each other, which makes it difficult to fit the wheel in the first situation of interaction 100.

30 The supports 2a, 2b may be made from a material that is analogous to that of the tray, as for example, wood, and/or they may be made from a different material, being fixed by any securing means.

Alternatively, the supports 2a, 2b and the tray 1 may be manufactured as a single piece.

The supports 2a, 2b may have any other shape than that of a "Y" with the projections separated by 120°, such as a "T" shape or any other shape following the teachings of the present invention.

One may also provide removable supports 2a, 2b, and in this way it is possible to remove or replace them by another support of another configuration, thus making the tray 1 of the present invention very versatile, since it may have several supports for wheels of different sizes in a single configuration. And this configuration may be modified, whenever necessary.

In the preferred embodiment, the tray 1 comprises nine supports located on its top part, arranged three by three, a row with three supports 2b, a second row with three supports 2a and a third row with three supports 2b. Evidently, the number of supports 2a, 2b may vary according to the area of the tray 1.

The trays 1 are provided in such a way that they can be easily stacked, their bottom part may have any configuration, so as to achieve the best interaction between the bottom tray and the top tray in a stack of trays, be they accommodating wheels/rims or not.

A preferred embodiment having been described, one should understand that the scope of the present invention embraces other possible variations, being limited only by the contents of the accompanying claims, which include the possible equivalents.